CMDS
ioDisplay User's Guide

Introduction

CMDS ioDisplay is the tool for viewing and setting the parameters for your experiment. This document describes how to use CMDS ioDisplay to control and monitor the environmental growth chambers and equipment in SLS Lab. Ask for help if you are unsure about how to use ioDisplay. If your experiment requires additional parameters, CMDS is configurable to meet your requirements.

Summary Description

CMDS ioDisplay is comprised of multiple windows to show an overview of parameters and graphs of all growth chambers, and individual growth chamber parameters and graphs. The main ioDisplay window is the *Overview* window showing three parameters on separate graphs of all the chambers; this window fills the entire screen area. If you want to view Individual chamber parameters and graphs move the mouse pointer over the name of the chamber at the top of the *Overview* window, it will highlight as shown in Figure 1 – Overview. Then click the mouse.
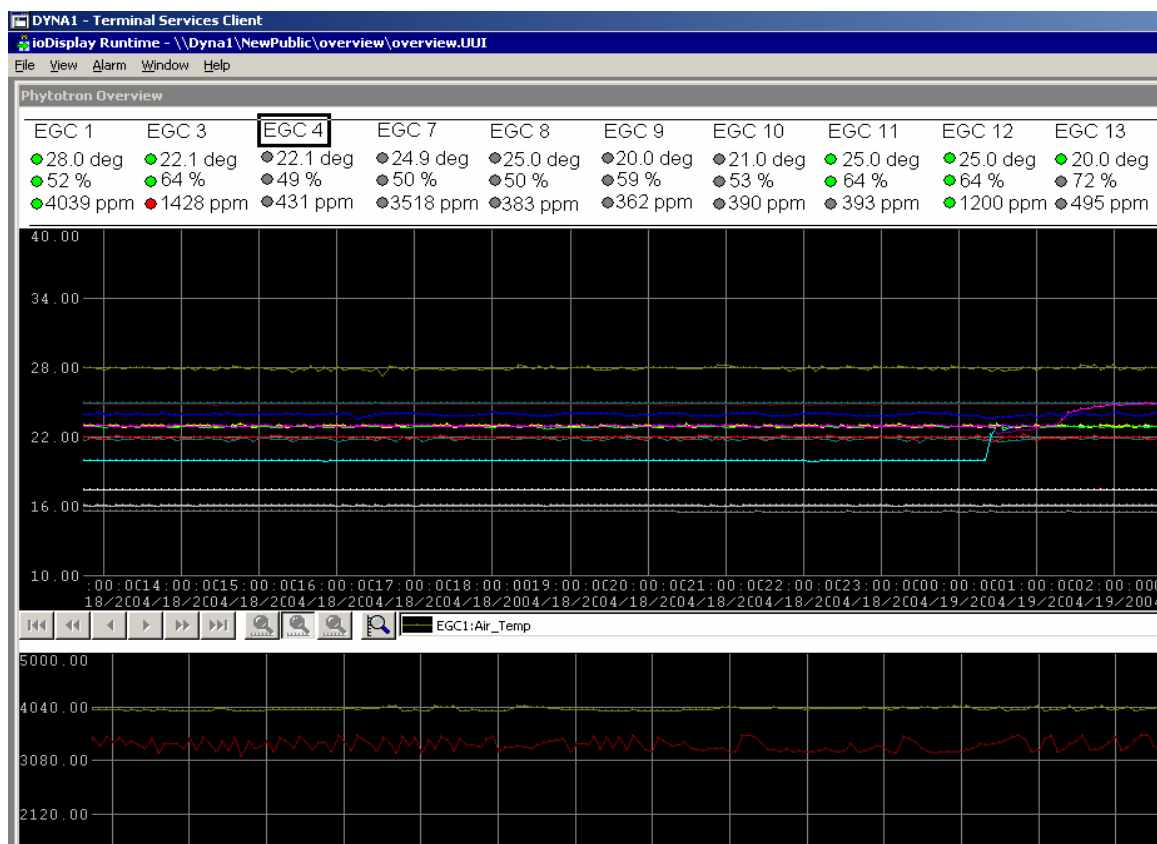

Figure 1 – Overview

The chamber you selected will become the active window and appear in front of the *Overview* window showing the default parameters and graph for that specific chamber. Default parameters are: Temperature, Relative Humidity, CO_2, Lights. All windows for each chamber will have at least these parameter values and graphs in real time.

Description of Views

The *Overview* window represents three parameters on three separate graphs for all the chambers in SLS Lab under CDMS monitoring and/or control for experiments. At the top of the Overview window are the names of each chamber and three parameter values in real time. Below the names are three *Overview* graphs representing separate parameter values in real time for all chambers. The top graph represents Temperature values; middle graph is Relative Humidity values, and the bottom for CO_2 values. The *Overview* is useful for obtaining current values and observing overall trends of all the chambers for the past 24 hours. If there is an *Individual chamber* window in front of the *Overview* window and you want to view the *Overview* window, simply click on any part of the *Overview* window and it will become the active window for complete viewing.

Viewing Parameter and Status Window

When viewing an Individual chamber there will be two windows, the top one is the parameters and status window and the window below is the graph window. The graph window is really four-in-one graphs. The four graphs are Temperature (Red), Relative Humidity (Blue), CO_2 (White), and Lights On/Off (Yellow). Temperature, Relative Humidity, and CO_2 have calibrated sensors. The Light sensor is NOT calibrated, it simply represents when the lights are on or off. The light value is displayed in volts.

When you select an individual chamber, a window similar to Figure 2 – Chamber Detail will appear with a graph corresponding to the individual chamber. This window is where you can view CMDS controlling the chamber in real time. It is updated every 10 seconds.
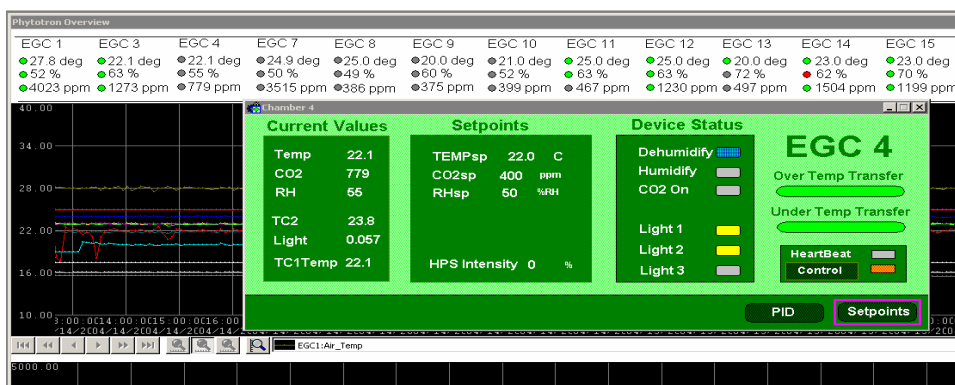

Figure 2 – Chamber Detail

This window is an example of the level of detail you will see; other chamber windows will look similar to this one depending on it having custom parameters or not.

Current Values and Setpoints (Figure 3) are easy to see and verify that CMDS is controlling the chamber within specifications.
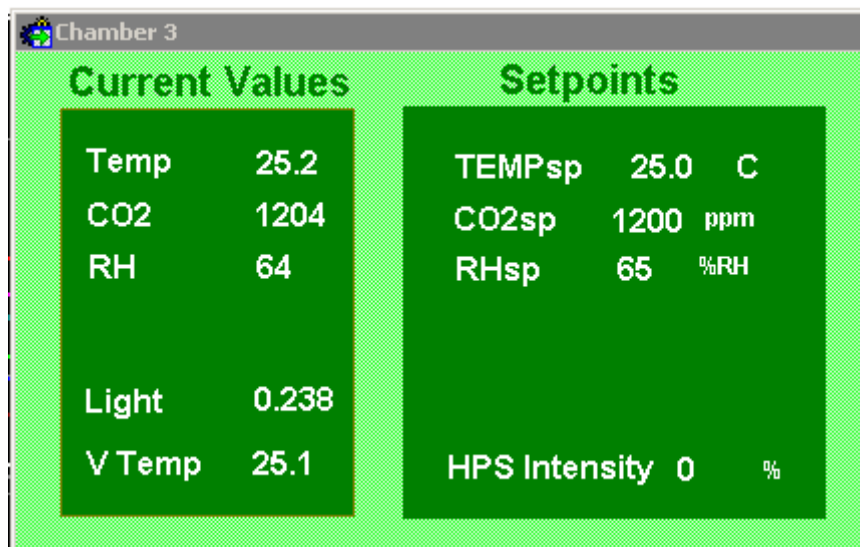

Figure 3 – Values & Setpoints

The Device Status (Figure 4) shows the status of the controls for the chamber. Normally this is will be Dehumidify & Humidify, CO_2, and Light Banks.
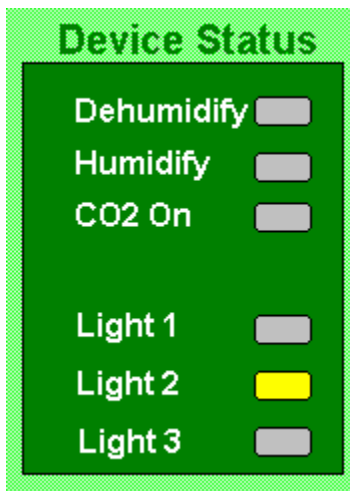

Figure 4 – Device Status

Light Banks will vary from chamber to chamber. When the box to the right of the control name is lit the control is turned on.

Below the chamber name, these indicators represent the over and under temperature transfer of control to the TC2 and *HeartBeat* which lets the user know the Opto22 brain is alive and working. The *Control* button below the *HeartBeat* button is to enable CMDS control of the chamber if it is orange, control is on. This part of the window is information important to IT & Engineering Support personnel. These are used for troubleshooting.

Just below the *Control* button is the *Setpoints* button. Click on this button to change the setpoints of the parameters for the chamber, a *Setpoints* window will appear on the screen (Figure 6).

Figure 5 – Setpoints Window

The *Setpoints* window has by default two columns of the same parameters. This is to allow the user to have two separate setpoints for day and night (diurnal) conditions. Typically day setpoints are in the left column and night in the right column. The first parameter is the time (24 hour time) you want the day conditions to begin. All the parameters set in the left column will be controlled at these setpoints until the right column time starts. Midnight is expressed as 23 hours and 59 minutes if it is not in the first column or 0 hours and 1 minute if it is in the first column. This is to enable calculating the on and off times easily. If you require more than two sets of conditions, more can be added by request. Selecting the name of each parameter will make an Enter Dialog window appear. Enter the value and select OK. The lights are changed On/Off by selecting the name of the light, this is a toggle switch. Some chambers have variable lights, in those cases an Enter Dialog window will appear, enter a value, and select OK. Clicking on the Temperature Limits will allow the user to enter the temperature values that will activate an alarm condition. If the temperature reaches these values the chamber will transfer control to the TC2 controller in an attempt to

protect your experiment until Engineering Support or Facility personnel can resolve the issue. At the right are the alarm settings. Guidelines for these settings are:

Temp HH and LL are set five degrees above and below setpoint.

Temp H and L are set two degrees above and below setpoint.

Temp Delay is set to five minutes.

 Temperature alarms are logged to the database and reported to the Phytotron Systems Engineer. It is his job to coordinate response to temperature alarms. Temperature alarms can also be sent to any email address. See the CMDS database users guide for setting up a user and email address and attaching an alarm to a parameter or ask one of the engineering support staff.

RH HH and LL are set to ten percent relative humidity above and below setpoint.

RH H and L are set to eight percent relative humidity above and below setpoint.

RH Delay is set to fifteen minutes.

Relative Humidity alarms are logged to the database and can also be sent to any email address.

CO2 HH and LL are set to setpoint plus or minus 20 percent of the setpoint value. For example for a setpoint of 1200 the HH value would be 1200 + 240 or 1440.

CO2 H and L are set to setpoint plus or minus 10 percent of the setpoint value.

CO2 Delay is set to 30 minutes. Figure 6 shows selection and setting of the alarm values.
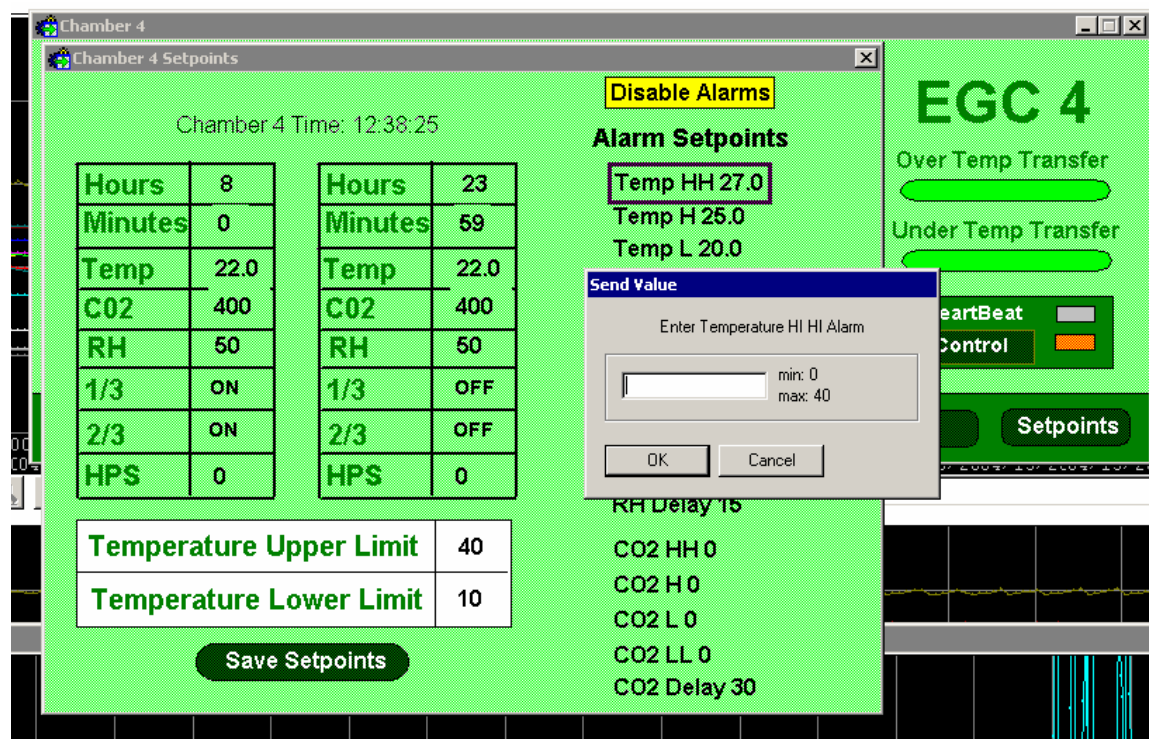

Figure 6. Entering Alarm Limits

Alarms for a growth chamber may be disabled by selecting the yellow *Disable Alarms* button. The alarm status lights will be shown in grey if disabled, either by having a value of 0 for the alarm value or by being disabled with the *Disable Alarms* button.

Select Save Setpoints when you are finished with the changes. If you select the X in the top right your changes will not be saved, but it will close the window.

Viewing Graphs

All graphs can be manipulated in different ways to create different views by using the toolbar at the bottom of each graph. The graphs represent 3 days of data from right to left (Figure 7) for the *Individual* chamber graphs and one day for the *Overview* graph. Data is updated every 5 minutes. The right side of the graph displays the most recent data.
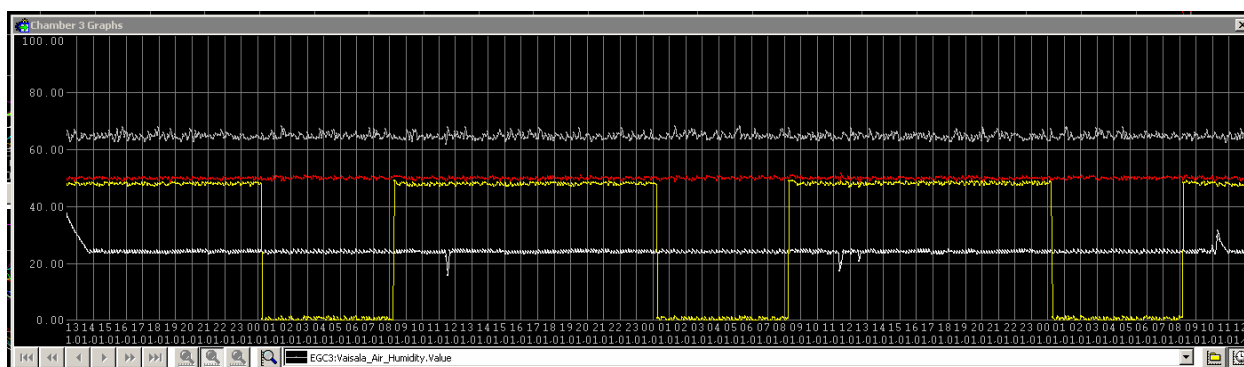

Figure 7 – Three Day Graph

In the middle of the toolbar is the line color icon and the name of the parameter you are currently viewing, since *Individual* graphs are 4-in-1 graphs you will see the other parameters. Click on the V symbol on the right side of the field, and click on one of the other parameters and watch the scale change on the left. Each parameter has a preset scale by default when IoDisplay is started. There is an option to change the scale by selecting the Edit Scale button. The Zoom buttons are to the left of the middle of the toolbar :Zoom In, Reset Zoom, and Zoom Out. Zoom in displays two hours of data, zoom out seven days and Reset takes it back to the default of three days for the *Individual Chamber* graphs and one day for the *Overview* (Figure 8).

Figure 8 – Graph Controls

Just to the left of the Parameter Field is the Edit Scale button, when you click on this an Enter Dialog window appears where you can change the upper and lower points of the scale.

NOTE: Pay attention to which parameter is listed in middle field at the bottom of the toolbar; this is the scale you are changing for the parameter the other parameter scales will be unaffected. Enter values between the max and min values then click OK to view the changes.

On the far right of the toolbar is the *Real Time* button, clicking on this will change the graph into real time mode. Just to the left of it is the *History* button, click this and a history table will appear and click on the month you want to view, and then click OK. When you are in *History* mode you can use the directional buttons on the far left, <<I << < > >> I>>, click on them and watch the graph move to the left or right. Please make it a habit to click on the *Real Time* button when you are finished viewing in *History* mode. It is also courteous to return the scales to the default values when finished.

"Where did ioDisplay GO?"

If ioDisplay is not visible and the screen is black on the CMDS monitor, then move the mouse or hit the space bar to "wake up" the computer monitor. If you see a "tropical scene" on the screen, then ioDisplay has either been minimized, closed, or the computer has been restarted. In the event ioDisplay has been minimized, then look for the interior (terminal client desktop) taskbar on the computer screen and left click on **ioDisplay Runtime** in the taskbar. If you can't see the **ioDisplay Runtime** in the taskbar, then you might need to scroll down the exterior (main desktop) for it to reveal itself. ***CMDS ioDisplay will not restart automatically if you reboot the computer!*** Note: parameter data points are collected and stored on a separate computer (server).

In the event ioDisplay program has been closed or the CMDS computer restarted, then please contact Len R. (1-2995), Phil F. (1-2942), Larry K. (1-2927), or Holly L. (1-2932) to start ioDisplay program.

General Notes:

Remote ioDisplay is available for scientists and engineers to view the status of chambers from any computer connected to the Internet using Internet Explorer 5 or above. Contact Len R. to receive login information and website address. It is recommended to have DSL or Cable connection to the Internet. Remote ioDisplay has less features available than ioDisplay in the control room. The ability to change setpoints remotely is currently disabled. The main purpose of having Remote ioDisplay is to be able to see what is happening remotely when there is an alarm condition.

Updates to the program require ioDisplay to be restarted. This only affects the view of the graphs; we lose the real time graph lines that were there before the restart of ioDisplay. This mean you will not be able to see graph lines from early in the day until the next day without using the history function. If the graph lines are partially across the graph it is either in History Mode or ioDisplay has been recently restarted. Do not close ioDisplay unless instructed by IT or Engineering Support personnel. This is done by

selecting the File menu at the top and selecting Exit or selecting the "X" in the top right corner of the ioDisplay screen.

The preference is to keep ioDisplay running all the time. However, the requirement to restart ioDisplay is normally required when any of the ioDisplay windows have been modified by IT Support or Engineering Support personnel. The preference is for ioDisplay changes to be made on Tuesdays in order for weekend check personnel to be able to view three days of data on the graphs. This is so they can easily determine any chamber anomalies.

Support is available to configure CMDS for specific experiment needs. Parameters can be added to the database, control logic developed in ioControl and displays created in ioDisplay. Some examples that have been implemented are four light cycles in a day, metered nutrient feed to cultivar, and high temperature protection for LED lamps. To request changes to be made to CMDS for your experiment you need to submit a Work Order at least two weeks in advance of your need date, more time in advance is better. Any questions, comments, or suggestions please contact:

Len Reinhart, IT Support (1-2995)
Phil Fowler, Engineering Support (1-2942)
Larry Koss, Engineering Support (1-2927)
Holly Loesel, Engineering Support (1-2932)